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REVIEW

Effects of non-pharmacological interventions on preoperative anxiety and postoperative pain in patients undergoing breast cancer surgery: A systematic review

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Abstract

Background: Poorly managed preoperative anxiety and pain were reported to slow the postoperative recovery of breast cancer patients. Thus, proactive management using non-pharmacological interventions becomes essential for decreasing opioid or anxiolytics consumption, anxiety level, pain intensity, postoperative complications and improving patients' haemodynamics and satisfaction with care.

Purpose: To identify, analyse and synthesise the effects of non-pharmacological interventions on preoperative anxiety and acute postoperative pain in women undergoing breast cancer surgery.

Method: For this systematic review, 12 databases including Ovid Nursing, PsycInfo, British Nursing Index, CINAHL, Cochrane Library were searched to identify relevant studies. A total of 6,012 articles were identified from the search, six RCTs and one quasi-experimental study that met the inclusion criteria were included after eligibility screening. Narrative synthesis was used to analyse data extracted from the included articles. The review adhered to the PRISMA guideline.

Results: Twelve outcomes were measured in the included studies, including preoperative anxiety, and acute postoperative pain. Music, massage, aromatherapy and acupuncture were the interventions delivered. Music had a small-to-large effect size and aromatherapy had a small effect size on reducing preoperative anxiety. Also, music had a large effect size whilst acupuncture had a medium effect size on minimising postoperative pain in women undergoing breast cancer surgery.

Conclusion: Music, aromatherapy and acupuncture appeared to be effective for reducing preoperative anxiety and postoperative pain in women undergoing breast cancer surgery. However, the small number of studies available for each intervention prevents conclusive statements about which the most effective method.

Implication for clinical practice: A nursing care pathway that standardises the use of non-pharmacological interventions for the management of both preoperative anxiety and postoperative pain in breast cancer surgery patients should be developed.

KEYWORDS
anxiety, breast cancer surgery, non-medicine, non-pharmacological, pain

[Correction added on 14 May 2021, after First Online Publication: the affiliation of the author Ka Ming Chow was changed]

1 | INTRODUCTION

Breast cancer is the most prevalent cancer amongst women, with approximately 2.1 million new cases worldwide (The International Agency for Research on Cancer (IARC) report, 2018) and there is thus a great need for early access to and optimal delivery of treatment. Common treatments for breast cancer often comprise surgery with or without radiotherapy and pharmacotherapy (Runowicz et al., 2016). The choice of treatment depends on the stage of the cancer. In most cases or stages of breast cancer, mastectomy, which involves the complete or partial removal of breast tissue (Anagnostopoulos, 2014), is used as a mainstay treatment modality (Loukas et al., 2011) and patients have the option of undergoing postoperative breast reconstruction (Dion et al., 2016).

Most of the patients who have undergone surgery have experienced anxiety in the immediate period before the surgery (Stamenkovic et al., 2018), breast cancer surgery patients inclusive. Meanwhile, the surgical procedure itself results in pain. The pain after breast cancer surgery is often due to a combination of perioperative, intraoperative and postoperative factors. Thus, adequate management of preoperative anxiety and postoperative pain is important to the patient's recovery.

Preoperative anxiety itself has been demonstrated in some studies to have influence on acute post-breast surgery pain (Andersen et al., 2015; Andersen & Kehlet, 2011; Kulkarni et al., 2017; Schreiber et al., 2013, 2014). In addition, the extensiveness of the surgery, depression (Schreiber et al., 2013, 2014), the adequacy of pain management (Chou et al., 2016), existing breast pain, pain in other parts of the body, and patient factors such as younger age and a high body mass index also influence pain after breast surgery (Andersen & Kehlet, 2011). However, a high level of preoperative anxiety have been indicated as the most predictive factor for higher pain levels after breast cancer surgery (Bruce et al., 2014; Kulkarni et al., 2017; Schreiber et al., 2013).

1.1 | Consequences of inadequate preoperative anxiety and postoperative pain management

The most common consequences of poorly managed preoperative anxiety have been predicted to be an increase postoperative pain level (Kulkarni et al., 2017), whilst inadequate postoperative pain management has been reported to slow postoperative recovery, increase the length of stay in hospital and lead to increase in postoperative complications, dissatisfaction with care (Kulkarni et al., 2017) and opioid consumption (Evans, 2019). Therefore, since adequate pain management is a critical component of care during a patient's recovery, it becomes essential to initiate its management by adequately managing predictive factors such as preoperative anxiety during the immediate preoperative period.

What does this paper contribute to the wider global community?

This systematic review demonstrates that

- The management of preoperative anxiety and postoperative pain using non-pharmacological interventions in women undergoing breast cancer surgery has been under researched globally.
- This could either mean to have reflected that the clinical community has focused limited the choices of this population to pharmacotherapy only or that the use of non-pharmacological therapy has not gained popularity for preoperative anxiety and acute postoperative pain management of this population.
- Nevertheless, music and aromatherapy have proven to effectively reduce preoperative anxiety whilst music and acupuncture can effectively reduce acute postoperative pain in these women.

1.2 | Preoperative anxiety and postoperative pain management

Preoperative anxiety is commonly managed using pharmacological strategies (Fayazi et al., 2011), but patients can benefit from using a variety of non-pharmacological interventions which can help to reduce side effects of medication and also be useful for postoperative pain management (Zhou et al., 2015). Some of the interventions have been examined for their effects on either pain or anxiety in non-breast cancer surgical patients.

For example, foot reflexology was found to be effective in reducing acute postoperative pain after abdominal surgery (Ozturk et al., 2018), whilst evidence-based pain management education was found to be effective in reducing acute postoperative pain in abdominal surgery outpatients (Best et al., 2018). In another study, music was determined to be effective in reducing pain intensity and other symptoms after thoracic surgery (Liu & Petrini, 2015). Poulsen and Coto (2018) also recommended music therapy as a mode of postoperative pain management, suggesting that the music should be calming and suited to a patient's preference. Moreover, Sin and Chow (2015) determined that music could be used as a postoperative non-pharmacological pain therapy, especially in gynaecological cancer patients. Others non-pharmacological therapies that have been recommended for pain management are acupuncture, cold or heat application, guided imagery, relaxation therapy (Chou et al., 2016; Paice et al., 2016; Runowicz et al., 2016), family education (Paice et al., 2016), dietary education (Runowicz et al., 2016) and massage (Ucuzal & Kanan, 2014).

In women undergoing breast cancer surgery, only a few non-pharmacological interventions have been examined for their effects on preoperative anxiety and/or postoperative pain (Beyliklioğlu &

Arslan, 2019; Binns-Turner et al., 2011; Dion et al., 2016; Franco et al., 2016; Li et al., 2011; Palmer et al., 2015; Quinlan-Woodward et al., 2016). In the studies that used similar non-pharmacological interventions, there is inconsistency in the effectiveness of the intervention on the outcomes. Previous reviews that focused on non-pharmacological interventions for either preoperative anxiety or pain have reported inconsistent effectiveness (Bradt et al., 2013; Donelli et al., 2019; Kühlmann et al., 2018; Lee, 2015; Yinger & Gooding, 2015). Despite the conflicting effectiveness reported by previous studies, there is still paucity of systematic reviews on the effects of non-pharmacological interventions used in controlling preoperative anxiety and postoperative pain in women undergoing breast cancer surgery. Hence, it becomes important to understand the concepts (such as intervention delivery modes, and the rigour of the study design) that may account for the inconsistencies, and further use the findings to develop an evidence-based non-pharmacological intervention.

2 | OBJECTIVE

The objective of this systematic review was to identify, analyse and synthesise studies on non-pharmacological interventions for reducing preoperative anxiety and acute postoperative pain in women undergoing breast cancer surgery.

3 | REVIEW QUESTIONS

1. What are the non-pharmacological interventions used for the management of preoperative anxiety in women undergoing breast cancer surgery?
2. What are the non-pharmacological interventions used for the management of acute postoperative pain in women undergoing breast cancer surgery?
3. What is the effectiveness of the non-pharmacological interventions used for the management of preoperative anxiety in women undergoing breast cancer surgery?
4. What is the effectiveness of the non-pharmacological interventions used for the management of acute postoperative pain in women undergoing breast cancer surgery?
5. What are the designs and components of non-pharmacological interventions used for the management of preoperative anxiety and postoperative pain in women undergoing breast cancer surgery?

4 | METHODS

This systematic review was conducted according to the preferred reporting items for systematic review and meta-analysis (PRISMA) guidelines (Appendix S1) and is registered with PROSPERO (CRD42020222778).

4.1 | Inclusion and exclusion criteria

Studies were included if they were randomised controlled trials (RCTs), were quasi-experimental studies, were published in peer-reviewed journals, were published in English, compared music therapy or massage therapy or aromatherapy or acupuncture with usual care or a combination of other care in breast cancer surgery patients, examined postoperative pain only, preoperative anxiety only, or combinations of either or both with other outcomes, and included patients scheduled for minor or major breast cancer surgery. Studies were excluded if they did not compare between groups, did not conduct a pre-intervention test, did not specify intervention methods, had outcomes that did not include either pain or anxiety, and did not focus on breast cancer surgery, either in diagnosis or treatment.

4.2 | Data sources

A systematic search of the literature was carried out by first formulating the Population, Intervention, Comparison, Outcome question and generating keywords. Twelve databases were searched including Ovid platform (Medline, Ovid Nursing, EMBASE, AMED, APA PsycINFO, Joanna Briggs Institute EBP database, Global Health and EMCARE), ProQuest platform (British Nursing Index and Health & Medical Collection), EBSCOhost platform (CINAHL) and the Cochrane Library.

4.3 | Search strategies

The search keywords for all of the databases included the following: 'mastectomy' or 'breast cancer surgery' or 'mastectomy patients' or 'breast neoplasm'; 'non-pharmacological pain management' or 'music therapy' or 'massage therapy' or 'aromatherapy' or 'acupuncture'; and 'pain' or 'pain, postoperative' or 'pain measurement' or 'preoperative anxiety' or 'anxiety'. In order to provide directionality for the search, music, massage, aromatherapy and acupuncture were specified as keywords in this review after preliminary review of previous studies revealed that these interventions were the most common for preoperative anxiety and pain management in postoperative patients including breast cancer surgery patients. Additional information about the search strategy is presented in Table 1.

4.4 | Methodologic quality assessments

The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools for RCT and quasi-experimental studies (Tufanaru, 2020). The JBI appraisal tool for RCTs comprises 13 appraisal questions covering the study's design, randomisation, intervention, data collection and instrumentation,

TABLE 1 Search strategy and initial results

Platforms	Databases	keywords	Initial result
	Cochrane Library	mastectomy OR (breast cancer surgery) OR (mastectomy patients) OR (breast neoplasm) in Title Abstract Keyword AND (non-pharmacological pain management) OR (music therapy) OR (Massage therapy) OR Aromatherapy OR acupuncture in Title Abstract Keyword AND pain OR (pain, postoperative) OR (pain measurement) OR (preoperative anxiety) OR anxiety in Title Abstract Keyword - (Word variations have been searched)	172
Ovid platform	mastectomy.mp. or Mastectomy/ or "breast cancer surgery".mp. or "mastectomy patients".mp. or "breast neoplasm".mp. or Breast Neoplasms/ AND "non-pharmacological pain management".mp. or "music therapy".mp. or Music Therapy/ or "massage therapy".mp. or Massage/ or Aromatherapy/ or Aromatherapy.mp. or Acupuncture/ or Acupuncture.mp. AND pain.mp. or Pain/ or "pain, postoperative".mp. or Pain, Postoperative/ or "pain measurement".mp. or Pain Measurement/ or "preoperative anxiety".mp. or Anxiety/ or anxiety.mp.		
	MEDLINE(R) 1946 to August 2019		152
	AMED (Allied and Complementary Medicine) 1985 to August 2019		28
	EMBASE 1910 to August 2019		117
	Joanna Briggs Institute EBP Database		9
	Ovid Emcare 1995 to August 2019		63
	Ovid Nursing Database 1926 to August 2019		38
	PsycINFO 1806 to August 2019		26
	Global health 1973 to August 2019		8
Proquest platform	noft(mastectomy OR (breast cancer surgery) OR (mastectomy patients) OR (breast neoplasm)) AND noft((non-pharmacological pain management) OR (music therapy) OR (Massage therapy) OR Aromatherapy OR acupuncture) AND noft(pain OR (pain, postoperative) OR (pain measurement) OR (preoperative anxiety) OR anxiety)		
	British Nursing Index 1936–2019		22
	Health and medical collections		68
EbscoHost	"(mastectomy OR (breast cancer surgery) OR (mastectomy patients) OR (breast neoplasm)) AND ((non-pharmacological pain management) OR (music therapy) OR (Massage therapy) OR Aromatherapy OR acupuncture) AND (pain OR (pain, postoperative) OR (pain measurement) OR (preoperative anxiety) OR anxiety)"		
	CINAHL	(Initial 7,594. Limiters: English, Female)	5,309

homogeneity of study participants, data analysis and results presentation. The tool for quasi-experimental studies comprises nine questions covering the clarity of variables, the homogeneity of participant characteristics, the use of a control group, the similarity in usual care provided and outcome measures, the completion of follow-up, the reliability of the instrument and the appropriateness of statistical analysis. The quality of each item was rated by two authors independently as 'yes', 'no', 'unclear' or 'not applicable'. When disagreement occurred, a consensus was reached by discussion to resolve the disagreement. More 'yes' responses on the appraisal items indicated a study of superior quality. The methodological quality of each of the included studies is summarised in Tables 2 and 3.

4.5 | Data extraction, analysis and synthesis

The JBI data extraction table was used to extract data from all of the studies included in this review. The data were thoroughly extracted by two independent authors, and a consensus was reached to solve any disagreement. The data extracted comprised the author, study location, sampling and sample size, intervention, outcome measure, instrument, and results. The data extracted from the included studies are summarised in Table 4.

The data extracted from each article were analysed and synthesised narratively to explicitly describe the dosage, mode of delivery and effectiveness of the non-pharmacological interventions

TABLE 2 Joana and Briggs Institute methodological quality appraisal

S/N	Joana and Briggs Institute critical appraisal checklist for randomised control trials	Beyliklioglu and Arslan (2019)	Franco et al. (2016)	Dion et al. (2016)	Li et al. (2011)	Palmer et al. (2015)	Quinlan-woodward et al. (2016)
1.	Was true randomisation used for assignment of participants to treatment groups?	Yes	Yes	Yes	Yes	Yes	Yes
2.	Was allocation to treatment groups concealed?	No	Yes	No	No	No	No
3.	Were treatment groups similar at the baseline?	Yes	Yes	Yes	Yes	Yes	Yes
4.	Were participants blind to treatment assignment?	Unclear	Yes	Unclear	No	Unclear	No
5.	Were those delivering treatment blind to treatment assignment?	No	No	No	No	No	No
6.	Were outcomes assessors blind to treatment assignment?	No	No	No	No	No	No
7.	Were treatment groups treated identically other than the intervention of interest?	Yes	Yes	Yes	Yes	Yes	Yes
8.	Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analysed?	Yes	Yes	Yes	Yes	Yes	Yes
9.	Were participants analysed in the groups to which they were randomised?	Yes	Yes	Yes	Yes	Yes	Yes
10.	Were outcomes measured in the same way for treatment groups?	Yes	Yes	Yes	Yes	Yes	Yes
11.	Were outcomes measured in a reliable way?	Yes	Yes	Yes	Yes	Yes	Yes
12.	Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes
13.	Was the trial design appropriate, and any deviations from the standard RCT design (individual randomisation, parallel groups) accounted for in the conduct and analysis of the trial?	Yes	Yes	Yes	Yes	Yes	Yes

investigated in each included study. A meta-analysis was not conducted because the intervention types varied, because there were small number of studies for each intervention and because different instruments were used for data collection in most of the studies.

5 | RESULTS

5.1 | Characteristics of included studies

A total of 6,012 articles were identified from the search strategy. RefWorks was used to manage the retrieved studies and for duplicate removal. There were 460 articles remaining after the removal of duplicates. An abstract- and title-only screen was conducted, resulting in the exclusion of 441 articles that did not meet the inclusion criteria. Afterwards, the reference lists of the identified papers were searched for relevant articles. There were no relevant articles found in the reference lists of the identified papers. Finally, a full-text review of 19 articles was conducted, and 12 were excluded because they were not published in English (n = 1), did not measure relevant outcomes (n = 2), were abstracts only (n = 2), did not conduct a pre-intervention test (n = 2), combined breast, thoracic and abdominal surgery (n = 1), had no comparison group (n = 1), commenced intervention intraoperatively (n = 1), included only breast biopsy patients (n = 1) or measured postoperative anxiety (n = 1). This afforded eight studies that met the inclusion. A flowchart of the study retrieval and selection process is presented in Figure 1.

Approximately 62.5% of the RCT studies had nine 'yes' responses, 25% had eight 'yes' responses, whilst the remaining 12.5% had 11 'yes' responses. Only one study concealed treatment allocation and blinded participants to treatment. All of the RCTs reported using computer generated table of random numbers for randomisation, but only one RCT reported concealing the treatment allocation and blinding the outcome assessor. The quasi-experimental study had 'yes' response to the nine critical appraisal questions.

5.1.1 | Country

The studies included in this systematic review were conducted in the United States (n = 5), Turkey (n = 1) and China (n = 1).

TABLE 3 Joana and Briggs Institute methodological quality appraisal

S/N	Joana and Briggs Institute critical appraisal checklist for quasi-experimental studies	Binns-Turner et al. (2011)
1.	Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Yes
2.	Were the participants included in any comparisons similar?	Yes
3.	Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Yes
4.	Was there a control group?	Yes
5.	Were there multiple measurements of the outcome both pre and post the intervention/exposure?	No
6.	Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analysed?	Yes
7.	Were the outcomes of participants included in any comparisons measured in the same way?	Yes
8.	Were outcomes measured in a reliable way?	Yes
9.	Was appropriate statistical analysis used?	Yes

5.1.2 | Theories

The theories mentioned in the included studies were the gate control theory (n = 1) and the symptom management theory (*n* = 1). The gate control theory was used to describe the physiology of pain, whilst the symptom management theory was used to describe the management of pain as a symptom. None of the included studies stated that a theory underpinned the intervention.

5.1.3 | Sample and sample size

The sample size ranged from 20 to 201 participants. All of the study participants were female and were scheduled for mastectomy (*n* = 4), autologous tissue reconstruction (*n* = 1), and mastectomy or breast-conserving surgery (*n* = 2).

5.1.4 | Intervention characteristics

The interventions delivered were music only (*n* = 3), massage and gratitude meditation (*n* = 1), aromatherapy (*n* = 3), and acupuncture (*n* = 1). The intervention delivery period varied between studies, and ranged from the day before surgery to the day of patient discharge, whilst the intervention sessions per contact lasted for 5 min or up to 4 h. Approximately 85.7% of the studies were two-group designs. Of these, 33.3% delivered the intervention to both groups. Only 14.3% of the included studies assigned participants to three groups and delivered the intervention to two groups. All of the included studies carried out a pre-test and post-test, and the time points for data collection were before and after the intervention.

5.1.5 | Outcomes

Twelve outcomes were measured, including acute postoperative pain (*n* = 2) and preoperative anxiety (*n* = 3). Other outcomes measured alongside anxiety were patient satisfaction (*n* = 2) and sedative effect (*n* = 1); haemodynamics (*n* = 1); stress, insomnia, tension, mood and energy (*n* = 1); and nausea and ability to cope (*n* = 1).

5.1.6 | Instruments

Ten different instruments were used in the included studies to measure the outcomes. For the anxiety measurement, the Spielberger State-Trait Anxiety Inventory (STAI) (*n* = 4) (Beyliklioğlu & Arslan, 2019; Binns-Turner et al., 2011; Franco et al., 2016), the Visual Analog Scale (VAS) 0–10 mm (*n* = 1) (Dion et al., 2016), the Numerical Rating Scale (NRS) (*n* = 1) (Quinlan-Woodward et al., 2016) and the Global Anxiety Visual Analog Scale (GA-VAS) (*n* = 1) (Palmer et al., 2015) were used.

For the pain measurement, the Short-Form McGill Pain Questionnaire (SF-MPQ) (*n* = 1) (Li et al., 2011), the NRS (*n* = 1) (Quinlan-Woodward et al., 2016) and the VAS (*n* = 1) (Binns-Turner et al., 2011) were used. For the stress measurement, the Perceived Stress Scale (*n* = 1) (Dion et al., 2016) was used for assessing stress, fatigue, mood and energy. Finally, for the patient satisfaction measurement, a questionnaire adapted from Consumer Assessment of Healthcare Provider System–Surgical Care Survey (*n* = 1) (Palmer et al., 2015) was used. For haemodynamics, automated non-invasive blood pressure monitors (*n* = 1) were used (Binns-Turner et al., 2011).

5.2 | Non-pharmacological intervention modality

5.2.1 | Aromatherapy

Aromatherapy was used in two of the included studies (Beyliklioğlu & Arslan, 2019; Franco et al., 2016) to reduce preoperative anxiety levels amongst patients undergoing breast cancer surgery. In the study by Beyliklioğlu and Arslan (2019), a baseline measurement of anxiety was conducted 24 h before surgery, whilst Franco et al. (2016) assessed baseline anxiety in the preoperative surgical waiting

TABLE 4 Summary of the characteristics of the included studies

Author; country	Study design; type of surgery	Sample size; mean age	Outcomes; instrument	Design of interventions	Result
Beyliklioglu, and Arslan. (2019); Turkey	RCT; women treated for breast cancer by: - Biopsy - Modified radical mastectomy - Excision - Breast-conserving surgery	Intervention (40); 54 ± 17.31 control (40); 48 ± 10.63	Anxiety; Spielberger State anxiety Inventory (STAI)	Intervention: aromatherapy (lavender oil inhalation), 3–4 drops of oil placed on a gauze bandage Duration: the gauze bandage was given to each patient for 20 min inhalation preoperatively on the day of surgery	The intervention group reported a significant reduction in anxiety levels ($p < .05$; Cohen's $d = 0.048$)
Franco et al. (2016); USA	RCT women treated for breast cancer but no clear distinction just categorised as major versus minor surgery and plastic versus oncologic surgery	Lavender fleur oil (LFO: 47); 53 ± 14 Unscented oil (UO: 46); 47 ± 12	Anxiety; the STAI	Intervention: LFO - Intervention: LFO and UO Patch test for allergic reaction; a drop of LFO or UO was applied to the back of the hand and covered with a dressing to prevent inhalation - Vital signs before and after aromatherapy - 2 drops of either 2% LFO or UO in a plastic face mask under a flow of oxygen for 10 min Duration: 10 min' inhalation	The intervention group reported a significant reduction in positive feelings ($p < .006$) and no significant reduction in negative feelings ($p > .006$)
Li et al. (2011); China	RCT; women treated for breast cancer by: Extensive radical mastectomy Modified radical mastectomy	Music (60); 44.88 ± 9.37 Control (60); 45.13 ± 9.48	Pain; Short-Form McGill Pain Questionnaire	Intervention: music therapy Intervention: music therapy - Duration: 30 min per session (6 – 8 am and 9 –11 pm). - Type of music: classical Chinese folk, popular world music, Chinese relaxation music and American Association of Music Therapists recommended music - Patient preference: yes - Device: MP3 player and headphones - Interventionist training: trained researcher. - Number of sessions: twice daily until discharge and during the first and second chemotherapy session - Volume control: yes; by the patients - Patients who missed a session were encouraged to adhere - Follow-up via telephone call.	The intervention group did not report a significant reduction in pain intensity ($p > .05$)
Binns-Turner et al. (2011); USA	Quasi-experimental study; women treated for breast cancer by: Mastectomy	Music (15), and control (15); 56.3 (42–70 years old)	Pain, anxiety, mean arterial blood pressure, heart rate; the Visual Analog Scale (VAS), STAI, Non-invasive blood pressure monitor, electrocardiograph	- Intervention: music - Duration: preoperatively until discharge from post-anaesthesia care unit (4 h) - Type of music: new age, classical, easy listening, inspirational. - Patient preference: yes; selection from the available genres. - Number of sessions: one - Device: iPod and earphones - Interventionist training: not specified - Volume control: 70 dB	The intervention group reported a significant reduction in pain ($p = .007$; Cohen's $d = -0.90$) and anxiety ($p < .00$; Cohen's $d = 1.99$) and a significant reduction in the mean arterial blood pressure was observed ($p = .003$)

(Continues)

TABLE 4 (Continued)

Author; country	Study design; type of surgery	Sample size; mean age	Outcomes; instrument	Design of interventions	Result
Palmer et al. (2015); USA	RCT; women treated for or undergoing diagnosis for breast cancer by; • Biopsy • Lumpectomy • Re-excision • Port-surgery • Mass excision Others		Anxiety, effect of sedatives, patient satisfaction; the Global Anxiety VAS (GA-VAS), bispectral index (BIS), the Consumer Assessment of Healthcare Providers and Systems Surgical Care Survey	Intervention: • LM and therapist-selected music. • RM +patient-selected music • LM +therapist-selected RM =preoperatively + intraoperatively. • RM +patient-selected RM =preoperatively for LM group and intraoperatively • UC +noise-blocking earmuffs (NBEs) = preoperatively +intraoperatively • Patients listened preoperatively to a live performance of their preferred music accompanied by guitar or keyboard • RM group • Patients listened to a downloaded recording of their preferred music via headphones. • The music therapist engaged the patient in a short music therapy session that included the preferred music plus brief conversation, which integrated processing of the song and questions surrounding the patient's song choice. • Preferred music was offered preoperatively, to create familiarity and autonomy LM and RM groups • Patients who received LM or RM preoperatively were provided with headphones and anMP3 player loaded with a therapist-selected playlist of instrumental harp music for intraoperative listening. • Before travelling to the operating room, the RM was initiated, and volume levels were adjusted to the patient's preference • UC group • Patients wore NBEs during surgery to block any music played by the surgeon. • All groups • Patients wore music headphones or NBEs until the conclusion of surgery • Duration: 5 min	The intervention groups (LM and RM) reported significant reduction in anxiety and a significant increase in satisfaction significant (p = .002; hedge's g: RM = −0.39, LM = 0.47)

(Continues)

TABLE 4 (Continued)

Author; country	Study design; type of surgery	Sample size; mean age	Outcomes; instrument	Design of interventions	Result
Dion et al. (2016); USA	RCT; women treated for breast cancer and/ or undergoing breast reconstruction; – Mastectomy and/or Autologous tissue reconstruction	Massage only (20); 47.95 ± 7.71 massage with guided meditation (20); 47.37 ± 9.24	Stress, anxiety, insomnia, fatigue, tension, pain, mood, energy; the VAS (0 – 10 mm), the Perceived Stress Scale	Duration: 20 min of intervention delivery daily, from postoperative days 1 to 3 Intervention: Patient's preferred site of massage only Patient's preferred site of massage and gratitude meditation *Massage* - Experienced massage therapist - Massage performed in a private hospital room - Massage individualised to patients' preference, with choice of essential an oil amongst five provided - *Guided Meditation* - 15 min' viewing of a DVD about paced breathing. - Instructions about gratitude meditation - Simultaneously delivered with massage - The therapist cued the patient to perform one episode of gratitude meditation for five people	The massage with meditation group reported no significant reduction in any of the study outcomes ($p > .05$)
Quinland-Woodward et al. (2016); USA	RCT; women treated for breast cancer); Mastectomy	Acupuncture (15); 53.7 ± 9.4 UC (15); 62.5 ± 11.5	Pain, anxiety, nausea coping ability; Numerical rating scale (NRS 0–10)	Intervention: acupuncture The intervention was two contacts per patient with a minimum of 12 h interval between each session. • Acupuncture was provided two twice postoperatively, with a minimum of 12 h between each session • No pre-planned acupoint used. • A patients' pre-intervention test was used to determine their symptoms and treatment. • Duration: 36 minu of needle time	The intervention group reported a significant reduction in pain ($p = .11$; Cohen's $d = 0.51$), anxiety ($p = .39$ Cohen's $d = -0.42$), and a significant improvement in coping ability ($p = .12$; Cohen's $d = 0.51$) after the first visit. Pain ($p = .017$; hedges' $g = .51$) and anxiety ($p = .051$; Cohen's $d = -0.79$) were significantly reduced in the intervention group after the second visit

Abbreviations: BIS, bispectral index; dB, decibel;GA-VAS, Global Anxiety Visual Analog Scale; LFO, Lavender fleur oil; LM, Live music; NBEs, noise-blocking earmuffs; NRS, Numerical Rating Scale;RM, recorded music; STAI, Spielberger State anxiety Inventory; UC, usual care; UO, unscented oil; VAS, Visual Analog Scale.

area immediately before commencing the intervention. Franco et al. (2016) also conducted a patch test to detect whether participants were allergic to the aromatherapy oil. Both of these studies used the STAI for outcome assessment and delivered aromatherapy on the morning of the day of surgery with a post-assessment immediately before the surgery started (Beyliklioğlu & Arslan, 2019; Franco et al., 2016). In one of the studies, three to four drops of lavender oil were placed on a gauze bandage given to each patient in the intervention group to inhale for 20 min (Beyliklioğlu & Arslan, 2019). The intervention group of another study inhaled two drops of lavender fleur oil via a plastic face mask at an oxygen flow rate of 2 L/min, whilst the control group inhaled unscented oil under the same condition. Both groups received the intervention for 10 min. However, the intervention did not result in a significant effect on negative feelings such as worry, tensed feeling and fear of death (Franco et al., 2016).

5.2.2 | Music therapy

Music therapy was used in three of the included studies. The studies evaluated the effects of music on postoperative pain (Binns-Turner et al., 2011; Li et al., 2011), preoperative anxiety (Palmer et al., 2015), haemodynamics and postoperative anxiety (Binns-Turner et al., 2011), patient satisfaction, and/or the amount of anaesthesia required (Palmer et al., 2015). Music was delivered as recorded music in three studies (Binns-Turner et al., 2011; Haun et al., 2001; Li et al., 2011) and as live music and recorded music in one study (Palmer et al., 2015).

The intervention was delivered in one session (Binns-Turner et al., 2011; Palmer et al., 2015) or twice daily after surgery, until the second chemotherapy session after discharge (Li et al., 2011). The duration of each session varied in all of the studies. Palmer et al. (2015) provided music for 5 min before the surgery and continued doing so intraoperatively for both the live music group and the recorded music group. In another study, music was delivered for 30 min, twice daily (Li et al., 2011). Binns-Turner et al. (2011) provided 4 h of continuous non-repeating music throughout the pre-, intra- and postoperative periods at the post-anaesthesia care unit.

All of the studies that provided recorded music did so via devices such as MP3 player with headphones (Li et al., 2011; Palmer et al., 2015), a cassette player with headphones (Haun et al., 2001) or an iPod with earphones (Binns-Turner et al., 2011). Only three studies

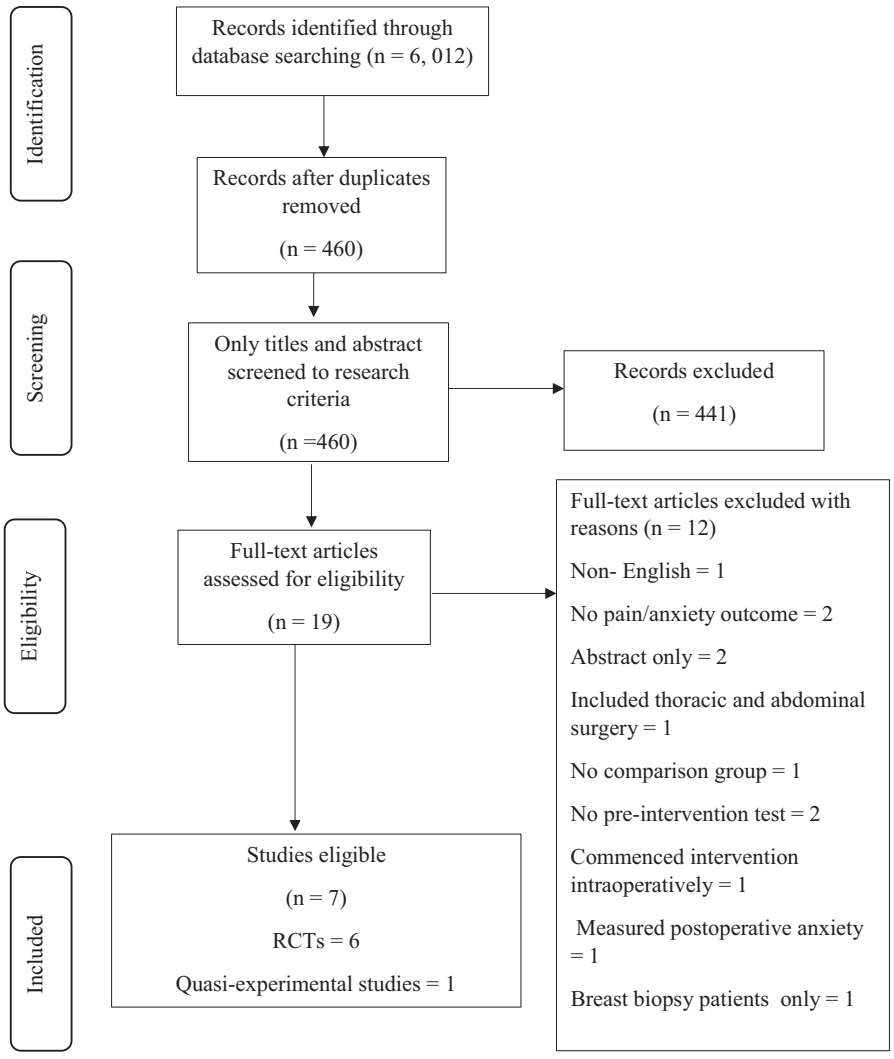

FIGURE 1 Flow chart of study retrieval and selection.
RISMA Group (2009) as cited in Moher et al. (2009)

considered patients' preference of music (Binns-Turner et al., 2011; Li et al., 2011; Palmer et al., 2015), two of which allowed participants to choose from a list of genres provided by the researchers. The other study allowed each participant to choose their own music and downloaded this on the devices provided to each participant (Palmer et al., 2015). The genres of music varied across the studies, and included genres such as new age (Binns-Turner et al., 2011), classical or classical Chinese folk music (Binns-Turner et al., 2011; Li et al., 2011), inspirational and easy listening music (Binns-Turner et al., 2011), popular world music, Chinese relaxation music and music recommended by the American Association of Music Therapists (Li et al., 2011).

Music was delivered by a trained researcher in one study (Haun et al., 2001; Li et al., 2011), by a music therapist in another study (Palmer et al., 2015), whilst the training of the intervener in the study of Binns-Turner et al. (2011) was not specified. One study allowed participants to self-administer the music intervention (Li et al., 2011). All the studies that used RM allowed the participants to control the volume to a desired level whilst Binns-Turner et al. (2011) locked the maximum volume to 70 dB. Of the four studies that delivered music therapy to patients receiving breast cancer surgery, only the study by Li et al. (2011) reported no significant effect on postoperative pain.

5.2.3 | Massage and meditation

Only one of the included studies adopted massage and gratitude meditation to reduce postoperative anxiety, pain and other outcomes, comprising insomnia, stress, tension, mood and energy in patients after breast cancer surgery (Dion et al., 2016). This study used massage in the control group and massage with meditation in the intervention group. In both groups, the baseline data were assessed before the intervention using the VAS. A post-intervention test was conducted on the third day after surgery.

Massage was provided to both groups with a consideration of patients' expressed needs, such as the location to be massaged, the technique, the pressure, the positioning and the use of music during massage. The participant's preference for use of an essential oil was also considered, as they were asked to choose from five essential oils that were available. The intervention was delivered once a day lasting 20 min per session within the first three postoperative days, using either Swedish massage, acupressure or foot-reflexology massage techniques. The massage with meditation group practised gratitude meditation simultaneously with the massage. The therapist instructed the participants to start the gratitude meditation midway through the massage. Participants were instructed to take a deep breath, close their eyes, imagine the person they were grateful to, and silently appreciate the person, whilst breathing out. The same meditation instruction was repeated five times such that the participants showed gratitude to five different persons through meditation. However, massage and meditation were found to be ineffective for reducing pain after breast surgery.

5.2.4 | Acupuncture

One of the included studies used acupuncture to alleviate pain and, nausea and coping abilities after breast cancer surgery, and reported a significant effect (Quinlan-Woodward et al., 2016). Two sessions of acupuncture were provided postoperatively, with a minimum interval of 12 h between each session. An average of 36 min needle-time without a pre-planned acupoint was used. The acupuncture was tailored to each patient's symptoms and condition. A single-use 30 mm long and 0.16–0.2 mm diameter needle was used. The acupuncture was delivered by an experienced acupuncturist. The NRS was used to assess the outcomes before and after the intervention.

5.3 | Evaluation of the effects of non-pharmacological interventions on study outcomes

The effects of non-pharmacological interventions on the study outcomes were reported in relation to the *p*-value set by each study to identify whether the intervention was effective or not whilst the effect size of studies that reported significance was calculated to determine how effective the intervention was (Chen et al., 2010; Goulet-Pelletier & Cousineau, 2018; McLeod, 2017) (Table 5). Cohen's d or hedges *g* value of 0.2–0.49 is regarded as small effect size, 0.5–0.79 is regarded as medium effect size whilst Cohen's *d* or hedges *g* value ≥0.8 is considered as a large effect size (Chen et al., 2010).

5.3.1 | Preoperative anxiety

Two studies evaluated the effect of aromatherapy on preoperative anxiety (Beyliklioğlu & Arslan, 2019; Franco et al., 2016), whilst one study utilised music (Palmer et al., 2015). Most of the studies reported a significant decrease in preoperative anxiety. However, they are not comparable as the instrument used to collect the data for anxiety differs and some studies reported overall anxiety (Binns-Turner et al., 2011; Palmer et al., 2015) whilst another study reported anxiety based on subscale (Franco et al., 2016). Of these studies, two assessed anxiety using the STAI (Beyliklioğlu & Arslan, 2019; Franco et al., 2016) whilst the GA-VAS was used in one study (Palmer et al., 2015). The STAI questionnaire is divided into two subscales: positive feelings and negative feelings, each of which contains 10 items. Franco et al. (2016) compared the score of eight items in each subscale and used it as the unit of analysis. However, the mean and standard deviation of the anxiety score were not reported. Franco et al. (2016) set the *p*-value at 0.006, because anxiety was evaluated using eight comparisons. The study found that there was a significant difference in positive feelings between the groups ($p = .001$) but that there was no significant difference in negative feelings between the groups ($p > .006$) (Franco et al., 2016). The other study that used STAI reported a significant difference between the groups for the overall anxiety score ($p = .035$) (Beyliklioğlu & Arslan, 2019). Palmer

et al. (2015) also reported a significant difference in the reduction of the anxiety level between the intervention group (LM and RM) and the control group when the GA-VAS was used ($p < .001$). The estimated effect size for music intervention was small (LM, Hedges' $g = -.39$, $r = -.19$; RM, hedges' $g = .47$, $r = -.23$) (Palmer et al., 2015). Similarly aromatherapy had a small effect size (Cohen's $d = 0.48$; $r = -.23$) on anxiety (Beyliklioğlu & Arslan, 2019).

5.3.2 | Postoperative pain

Four studies examined the effects of non-pharmacological interventions on acute pain after surgery, using the VAS (Binns-Turner et al., 2011; Dion et al., 2016), the NRS (Quinlan-Woodward et al., 2016) and the SF-MPQ, which contains the VAS (Li et al., 2011). Of these, only half reported a significant decrease in acute postoperative pain intensity. Two of the studies used music therapy (Binns-Turner et al., 2011; Li et al., 2011), one used massage with or without meditation (Dion et al., 2016) and the other used acupuncture (Quinlan-Woodward et al., 2016). The study that used massage therapy found no significant difference in the pain intensity between the groups within 72 h after surgery ($p > .05$) (Dion et al., 2016).

However, in the studies that used music, the results were inconsistent for the pain intensity between the groups: there was a significant difference in one study ($p = .007$) (Binns-Turner et al., 2011) but no significant difference in another study ($p > .05$) (Li et al., 2011). Nevertheless, music had a large effect size (Cohen's $d = -0.90$) in the study by Binns-Turner et al. (2011). Finally, acupuncture was reported to have a significant effect on reducing pain intensity between groups ($p = .01$). There was a medium effect of acupuncture on pain intensity (Cohen's $d = 0.51$; hedges' $g = .51$) after the first and the second dose (Quinlan-Woodward et al., 2016).

5.3.3 | Other outcomes

Other outcomes reported in the included studies were stress, relaxation, insomnia, alertness, fatigue, tension, mood energy (Dion et al., 2016), anaesthesia requirements, satisfaction (Palmer et al., 2015), nausea and coping abilities (Quinlan-Woodward et al., 2016), postoperative anxiety (Binns-Turner et al., 2011; Dion et al., 2016; Quinlan-Woodward et al., 2016) and haemodynamics (Binns-Turner et al., 2011). There was a significant reduction in nausea and coping abilities (Quinlan-Woodward et al., 2016), whilst mean arterial pressure heart rate and postoperative anxiety was only significantly reduced in one study (Binns-Turner et al., 2011). There were no significant differences in stress, relaxation, insomnia, alertness, fatigue, tension, or mood and energy between the massage and massage with meditation groups (Dion et al., 2016). Similarly, satisfaction with care and anaesthesia requirement were not significantly different between the groups ($p > .05$) (Palmer et al., 2015). However, nausea and coping abilities were significantly different ($p = .011$, Hedges' $g = .000$; $p = .012$, Hedges' $g = -.237$, respectively) between the

TABLE 5 Comparison of the effectiveness of the various non-pharmacological interventions

Intervention	Author; Country; Design	Type of surgery	Preoperative anxiety	Postoperative pain	Other outcomes
Aromatherapy	Beyliklioglu, and Arslan. (2019); Turkey; RCT Franco et al. (2016); USA	Biopsy, MRM, Excision, BCS, Breast cancer	$p = .035$ (Cohen's $d = 0.048$) $p > .006$*	NA	NA
Music	Palmer et al. (2015); USA; RCT Li et al. (2011); China; RCT Binns-Turner et al. (2011); USA; quasi-expérimental	Biopsy, lumpectomy, re-excision, port-surgery, mass excision, others ERM, MRM Mastectomy	$p = .002$ hedge's g: RM = −.39 LM = .47 NA NA	NA $p > .05$ $p = .007$ (Cohen's $d = -0.90$)	$p > .05$ (Anaesthesia requirement, satisfaction with care) NA Postoperative anxiety ($p < .00$; Cohen's $d = 1.99$); Mean arterial pressure ($p = .003$; Cohen's $d = -0.095$)
Massage	Dion et al. (2016); USA; RCT	Mastectomy or breast reconstruction	NA	$p > .05$	$p > .05$ (Stress, relaxation, fatigue, tension, mood, energy, postoperative anxiety)
Acupuncture	Quinland-Woodward et al. (2016); USA; RCT	Mastectomy	NA	First visit: ($p = .01$; Cohen's $d = 0.51$) Second visit: ($p = .017$; hedges' $g = .51$)	$p > .05$ (Nausea), Coping abilities ($p = .12$; Cohen's $d = 0.51$) Postoperative anxiety ($p = .04$; Cohen's $d = -0.42$ at first dose and −.79 at second dose)

Abbreviations: BCS, breast-conserving surgery; ERM, extensive radical mastectomy; LM, live music; MRM, modified radical mastectomy; NA, not applicable; RM, recorded music.

*Study set p – value at .006 because they assessed eight comparisons.

acupuncture and the usual care groups (Quinlan-Woodward et al., 2016).

For postoperative anxiety, studies used music (Binns-Turner et al., 2011), acupuncture (Quinlan-Woodward et al., 2016) and massage with or without meditation (Dion et al., 2016). There was no significant difference in the anxiety level between the massage only and massage with meditation groups ($p > .05$) (Dion et al., 2016). However, music intervention produced a significant difference between groups and had a large effect size ($p < .001$, Cohen's $d = -1.191$) (Binns-Turner et al., 2011). Similarly, acupuncture had a significant difference between the groups with a small effect size ($p = .04$, Cohen's $d = -0.42$) after the first dose and a medium effect size (Hedges' $g = -.79$) after the second dose (Quinlan-Woodward et al., 2016).

Haemodynamics was assessed as mean arterial pressure and heart rate (Binns-Turner et al., 2011). These outcomes were assessed using automated monitors at the post-anaesthesia care unit. The heart rate was not significantly different between groups ($p > 05$) (Binns-Turner et al., 2011). However, the mean arterial pressure was significantly different between the groups ($p = .003$) (Binns-Turner et al., 2011), and music had a large effect size on the mean arterial pressure (Cohen's $d = -.951$) (Binns-Turner et al., 2011).

6 | DISCUSSION

This systematic review was conducted to analyse various non-pharmacological interventions for reducing preoperative anxiety and acute postoperative pain amongst patients undergoing breast cancer surgery. Six RCTs and one quasi-experimental studies were identified and critically appraised for their methodological quality. None of the included RCTs blinded those assessing the outcomes. This may have caused bias in the outcome assessments, therefore influencing the reliability of the results. Similarly, only one study blinded the participants to the intervention and reported concealment of allocation to the intervention group(Franco et al., 2016). To improve the quality of RCT studies and to properly determine the effectiveness of an intervention, researchers need to minimise bias by ensuring that blinding and allocation concealment are used wherever possible (Polit & Beck, 2012).

The selection of an intervention type and the duration of each intervention session, as well as the intervention period, are essential factors in determining the effectiveness of a treatment. However, only two studies mentioned the theories that underpinned their intervention—the gate control theory (Li et al., 2011) and the symptom management theory (Quinlan-Woodward et al., 2016)—but they did not explicitly state whether these theories were also used to underpin their treatment selection or study. The types of interventions varied across the included studies, and for those that used similar interventions, there were differences in the delivery technique, the duration of intervention delivery, the use of trained interveners, the assessment tools and the outcomes measured.

For the two studies that used aromatherapy (Beylikliоğlu & Arslan, 2019; Franco et al., 2016), preoperative anxiety was the only outcome assessed; the sessions lasted for 10 min (Franco et al., 2016) and 20 min (Beylikliоğlu & Arslan, 2019); and the mode of intervention delivery was different for both studies. However, only one study reported a decrease in overall preoperative anxiety compared with the control group (Beylikliоğlu & Arslan, 2019), whilst the other reported a difference in positive feelings between groups (Franco et al., 2016). The inconsistent findings of these studies may be due to differences in the volume of oil used, in the provision of the intervention in the control group, in the duration of the inhalation and/or in the differences in the *p*-values that were set. The findings in this review are not consistent with findings from a previous review in which aromatherapy was reported to have a significant effect on anxiety across all of the included studies (Donelli et al., 2019). This inconsistency could be because we only included studies that used aromatherapy in women undergoing breast cancer surgery as compared to the systematic review by Donelli et al. (2019) in which studies that provided aromatherapy for any group of patients were included.

Similarly, the three studies (Binns-Turner et al., 2011; Li et al., 2011; Palmer et al., 2015) that used music therapy differed in the types of music, the delivery strategy, the session duration, the period of the intervention and the outcome measures. Most of the studies used RM. According to Robb, Burns and Carpenter (Robb et al., 2011), the difference in intervention design, the sample size, the dosage of music and the settings where the music therapy was provided are factors that contribute to the inconsistency in the findings of the music intervention studies. Despite the inconsistencies in the study design and findings, music had a large effect size on postoperative pain, postoperative anxiety and mean arterial blood pressure (Binns-Turner et al., 2011). However, the effect size of music on preoperative anxiety was small effect size (Palmer et al., 2015). This small effect size might be as a result of the variation in the type of breast cancer surgery and the short duration of the intervention delivery.

In sum, the findings about the efficacy of music therapy for preoperative anxiety management are consistent with those of previous systematic reviews (Bradt et al., 2013; Nilsson, 2008). However, for postoperative pain and anxiety, the findings were inconsistent with those of previous reviews (Kühlmann et al., 2018; Lee, 2015; Yinger & Gooding, 2015). This may be because we only included music interventions studies for patients undergoing breast cancer surgery compared to previous reviews that included either medical or general surgical populations.

Furthermore, massage with or without guided meditation resulted in no significant difference in the outcomes measured (Dion et al., 2016), whilst acupuncture was effective for reducing postoperative pain and nausea and increasing coping abilities (Quinlan-Woodward et al., 2016). Despite the significant difference between the groups in all of the outcomes measured in the study that used acupuncture, the effect size was small (Quinlan-Woodward et al., 2016). However, massage with or without did not result in a significant difference between groups probably because the control group also received massage therapy and the fact that a single instrument

to assess all of the outcomes (Dion et al., 2016). Although acupuncture was reported to be effective, its administration requires more expertise and it is more invasive than massage, thus making it difficult for nurses to provide in a clinical setting, for relatives to provide for patients and for patients to provide for themselves.

According to Larsson et al. (2017), trauma to different chest tissues increases the severity of pain after breast cancer surgery, and women undergoing breast cancer surgery are typically experience anxiety before and after surgery (Tamaki et al., 2017). Therefore, anxiety and pain management is essential for the recovery trajectory of women undergoing breast cancer surgery. Considering that surgical nurses spend more time with patients before and after surgery, they have an essential role in controlling anxiety and pain. Thus, the development of a nursing intervention for anxiety and pain management that takes the nurses' role, a patient's culture and preference, and the cost of care into consideration (Odejobi et al., 2019) is essential. This is also consistent with the fact that advancements in nursing science have shifted to patient-focused interventions (Luan et al., 2019).

Overall, the results of each study in this review varied because of the different designs, methods, instruments, and that were outcomes measured. It was also found that most of the studies were carried out in the West using interventions that are culturally acceptable. It is known that cultural context may influence the acceptability, choice and outcomes (Kayode, 2018) of an intervention. Therefore, non-pharmacological interventions for anxiety and pain management in breast cancer surgery patients need to be studied in-depth. Most importantly, as music intervention appeared to be more effective for preoperative anxiety and postoperative pain with respect to the effect size of different studies that reported significant differences in these outcomes, it is essential that the role of culturally specific music, and a patient's preference be explored. Hence, music may have a high potential to be effective for the management of preoperative anxiety and postoperative pain in women receiving breast cancer surgery as individuals can select the music for use in the intervention that best fits their cultural background and personal preferences (Robb et al., 2011).

6.1 | Limitations

There were limitations to this systematic review. First, the information pooled from the included studies could not be used to perform a meta-analysis because of the heterogeneity of the included studies. Second, the number of studies included in this review was small, which shows that there is a need for more RCTs with robust study design for this population that focus on preoperative anxiety and postoperative pain as outcomes.

7 | RELEVANCE TO CLINICAL PRACTICE

This review has two implications for nursing practice. First, a nursing care pathway that focuses on the management of both preoperative anxiety and postoperative pain in breast cancer surgery patients should be developed. Second, RCTs of high methodological quality should be conducted to assess the effects of specific interventions for the management of preoperative anxiety and postoperative pain in women receiving breast cancer surgery. This will improve the quality and amount of evidence on the efficacy of each non-pharmacological intervention in this population, thus creating a sound basis for the evaluation of the efficacy and efficiency of each intervention in clinical practice.

8 | CONCLUSION

This review revealed that aromatherapy (Beyliklioğlu & Arslan, 2019) and music (Palmer et al., 2015) appeared to result in small or small-to-large effect sizes when used for minimising preoperative anxiety in patients undergoing breast cancer surgery, whilst music (Binns-Turner et al., 2011) and acupuncture (Quinlan-Woodward et al., 2016) resulted in a medium-to-large effect size when used to manage acute postoperative pain in these patients. However, the small number of studies available for each intervention and the variation in the extensiveness of breast cancer surgery (mastectomy and/or reconstruction) prevented a definitive conclusion to be drawn on specific methods suitable for managing preoperative anxiety and postoperative pain in patients undergoing breast cancer surgery.

Therefore, since music has been used in some studies preoperatively for managing anxiety and postoperatively in others for managing pain, patients undergoing breast cancer surgery may benefit from music that is tailored to an individual's preference and culture to provide relief for their anxiety before surgery as well as acute postoperative pain.

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CONFLICT OF INTEREST

None.

AUTHORS CONTRIBUTIONS

TYO and LW involved in data collection and critical appraisal. CKM involved in study supervision. TYO, CKM and LW involved in manuscript writing. CKM and TYO involved in critical revisions for important intellectual content.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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